

Ballistic Missile Defense Overview

– Phased Adaptive Approach –



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Missile Defense Agency
August 17, 2011**



Ballistic Missile Proliferation

Threat

- Real
- Growing
- Unpredictable
- Anti-ship ballistic missiles threaten flow of commerce
- Threatens regional stability



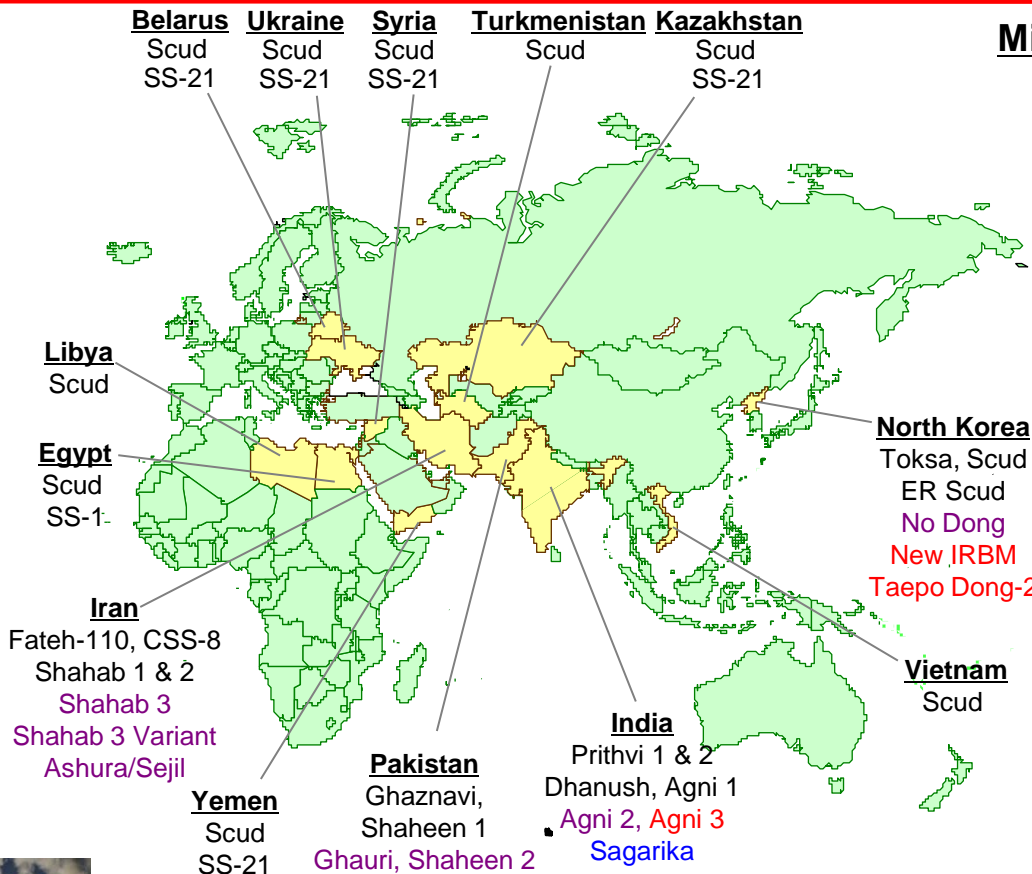
**Iranian SRBM,
20 August 2010**



**Iranian Underground
Launch Silo
27 June 2011**



**Iranian Salvo Launch
28 June 2011**



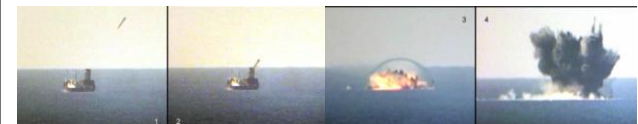
Missile Defense Attributes

- Provides extended deterrence
- Devalues missile proliferation
- Dissuades ballistic missile investment
- Enables international cooperation for regional defense



**Taepo Dong-2 Launch
April 2009**

**Iranian Anti Ship Missile
June 2011**



2010 Ballistic Missile Force Levels Not Including U.S., China, Russia or NATO	
SRBM	5,000-5,500
MRBM	500-700
IRBM	<40 IRBM
ICBM	0-10 ICBM
Totals	5,550-6,250

Sources: NASIC, Ballistic and Cruise Missile Threat, 2009; DIA, Iran's Military Power, Statement before the Senate Armed Services Committee, 14 APR 10; DIA, Annual Threat Assessment 2008; MSIC, e-mail, RE: Unclassified Force Level Numbers, 7 February 2011; DNI, Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, Covering 1 JAN to 31 DEC 29, FARS News Agency; Open Source Center (OSC), Iranian TV shows footage of "under ground launch silos" IAP20110627950192, 27 June 2011



Homeland Defense

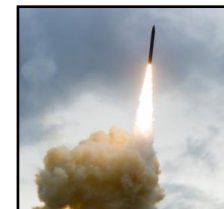
Fort Greely Missile Field 2



- **Missile Field 2 Construction – 2011**
 - **Provides 14 additional silos**
- **Fort Greely Power Plant – 2011**
 - **Provides stable, survivable, shielded power to mission critical facilities**



- **2-stage GBI 1st flight – JUN 10**
- **Fort Greely 2nd Fire Control Node – 2011**
- **GBI fleet refurbishment and upgrade program**
 - **Sustains GBI life to 2032**



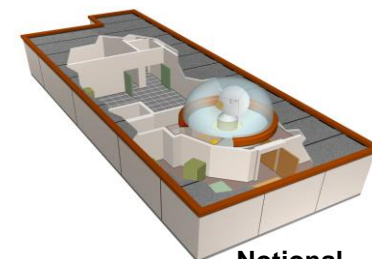
Thule

- **Thule Radar Upgrade – 2011**
- **Clear Radar Upgrade – 2015**

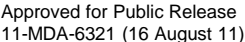


Clear

- **Ft Drum NY IFICS Data Terminal (IDT) – 2015**
 - **Better intercept opportunities across larger battle space**
 - **Improved handover accuracy**

























Notional





European Phased Adaptive Approach To Developing And Deploying Missile Defense

Phase I: Deploying Today's Capability (By Dec 2011)	Phase II: Enhancing Medium Range Missile Defense (By 2015)	Phase III: Enhancing Intermediate Range Missile Defense (By 2018)	Phase IV: Early Intercept of MRBMs, IRBMs and ICBMs (By 2020)
 <p>Aegis BMD 3.6.1 with SM-3 IA</p>  <p>AN/TPY-2 (FBM)</p>  <p>C2BMC AOC Ramstein</p> <p>ALTBMD Interim Capability</p>	 <p>Aegis BMD 4.0.1/5.0 with SM-3 IB</p>  <p>Aegis Ashore 5.0 with SM-3 IB (one site)</p>  <p>AN/TPY-2 (FBM)</p>  <p>C2BMC Updates</p> <p>ALTBMD Lower Tier</p> <p>Potential EPAA Enhancements</p>  <p>THAAD</p>	 <p>Aegis BMD 5.1 with SM-3 IIA</p>  <p>Aegis Ashore 5.1 with SM-3 IB/IIA (two sites)</p>  <p>AN/TPY-2 (FBM)</p>  <p>C2BMC Updates</p> <p>ALTBMD Upper Tier</p>  <p>PTSS</p> <p>Potential EPAA Enhancements</p>  <p>THAAD</p>  <p>ABIR</p>	 <p>Aegis BMD 5.1 with SM-3 IIA</p>  <p>Aegis Ashore 5.1 with SM-3 IIB (two sites)</p>  <p>AN/TPY-2 (FBM)</p>  <p>Enhanced C2BMC</p>  <p>PTSS</p> <p>Potential EPAA Enhancements</p>  <p>THAAD</p>  <p>ABIR</p>



European Phased Adaptive Approach

– Phase I: Deploying Today's Capability (by December 2011) –

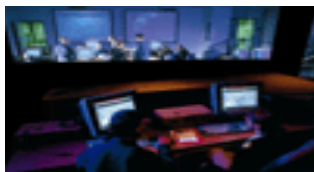
**Phase I: Deploying Today's Capability
(By Dec 2011)**



Aegis BMD 3.6.1 with SM-3 IA



AN/TPY-2 (FBM)



C2BMC AOC
Ramstein

ALTBMID Interim Capability



USS Monterey on Station, June 2011



SM-3
Block IA



U.S.



C2BMC Ramstein

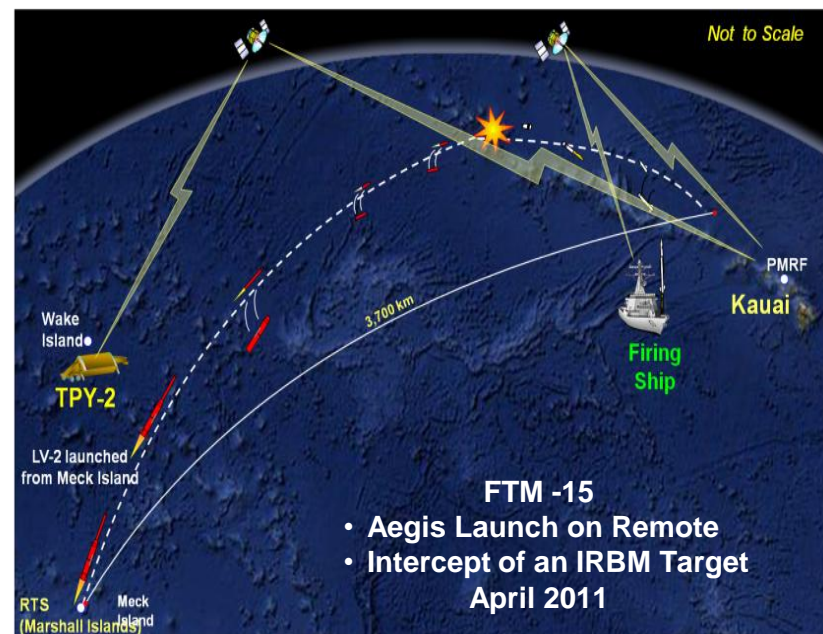


NATO



CAOC Uedem

ALTBMID and C2BMC
Interoperability Testing
June 2010 – July 2011





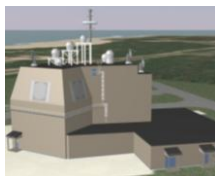
European Phased Adaptive Approach

– Phase II: Enhancing Medium Range Missile Defense (By 2015) –

Phase II: Enhancing Medium Range Missile Defense (By 2015)



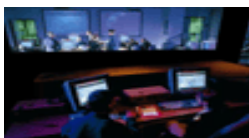
Aegis BMD 4.0.1/5.0 with SM-3 IB



Aegis Ashore 5.0 with SM-3 IB (Romania)



AN/TPY-2 (FBM)



C2BMC Updates

ALTBMD Lower Tier

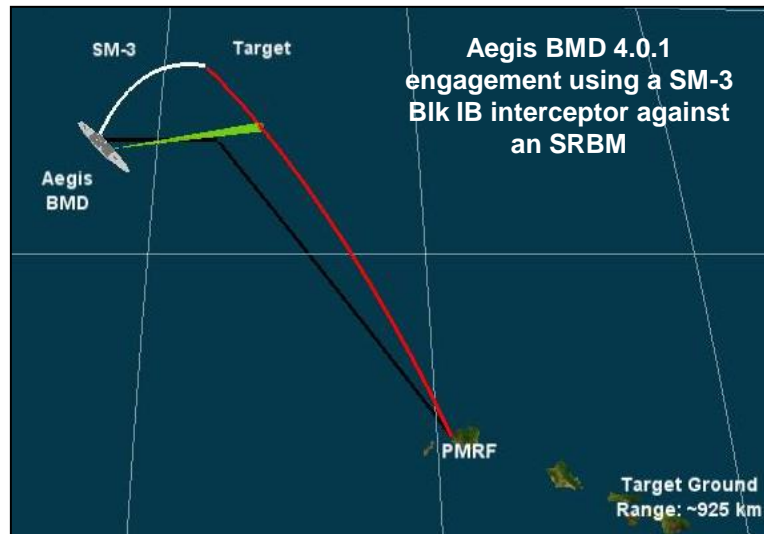
Potential EPAA Enhancements



THAAD



SM-3 Block IB



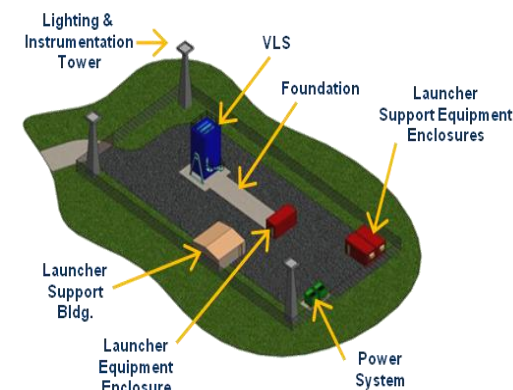
FTM-16 Event 2 (4Q FY11)



Vice Chief of Defense, Romania visits Aegis BMD June 2011



Aegis Ashore Site In Romania



Aegis Ashore Testing Complex
Pacific Range Missile Facility - Hawaii



Phase 3/4 Architecture Trade Parameters

Phase 3/4 Attributes

- Large Raid Size
- Large Adaptable Battle Space
- Intercepts Full Spectrum of Threats (SRBM to ICBM)
- Addresses Increased Threat Sophistication
- Assured Persistent Global Threat Tracking

Trade Drivers

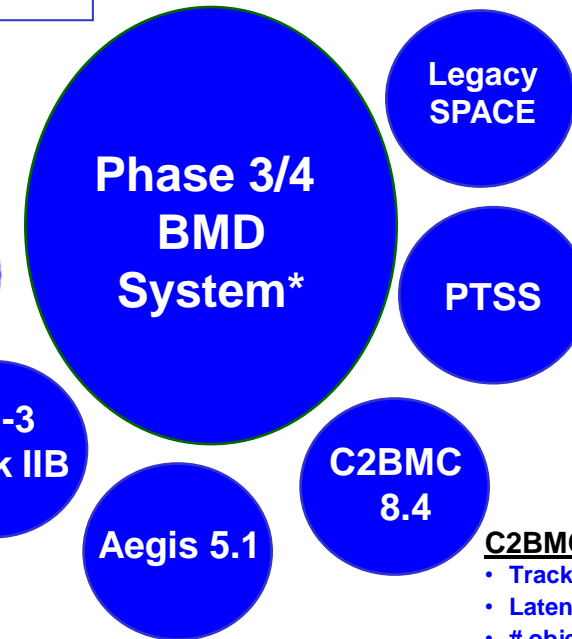
- Highest P_{ES} at Minimum Cost
- Maintain Deployed Advantage over Increasing Threat

SM-3 Block IIA

- Containment (Boost/Endgame) (Divert+FOR)
- Time to Intercept
- Acquisition/Discrimination Ranges
- KW Comm Range, Update Rate

SM-3 Block IIB

- Containment (Boost/Endgame) (Divert+FOR)
- Time to Intercept
- Acquisition/Discrimination Ranges
- KW Comm Range, Update Rate



Aegis Weapon System

- Weapon Op Area
- # RV's Negated in Raid
- # Simultaneous Engagements
- Firing Rate
- Reaction Time
- Communication Range to Interceptor, Update Rate

Legacy Space/Ground

- Tracking Accuracy as $f(\text{time})$,
- Burn Out State Vector Accuracy as $f(\text{time})$
- Latency (Initial/Update/Task Response Time, Bandwidth)
- Update Rate
- Object Separation in Feature Space as $f(\text{time})$

PTSS

- Tracking Accuracy as $f(\text{time})$
- Latency (Task Response Time, Bandwidth)
- # of Simultaneous Objects in Track
- Max track range (Sensitivity)
- Resolution

C2BMC

- Track Accuracy (Boost and Post Boost) as $f(\text{time})$
- Latency (Comm and Processing time, Bandwidth)
- # objects Correctly Discriminated as $f(\text{time}, \text{Threat Complex})$
- # of Unengaged Threats and Missed Threats (Leakers vs Raid Size)
- # Of Independent shots per Threat Launch Event (Depth of Fire)
- Update Rate



Phase 3/4 Architecture Trade Schedule

Event	Program	FY10 FY11	FY11		FY12				FY13			
			3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
BMDS Reviews	Battle Rhythm (Reviews)	◆ SR	◆ IPR	◆ QSR1 ◆ QSR2	◆ QSR3 ◆ IPR	◆ QSR4 ◆ IPR	◆ QSR5 ◆ IPR	◆ QSR6 ◆ IPR	◆ QSR7 ◆ IPR	◆ QSR8 ◆ IPR		
Phase 3/4 Element Milestones	SM-3 IIA					◆ PDR				◆ PS CDR		◆ CDR
	AWS 5.1	◆ SRR			◆ SRR-2	◆ SDR-1		◆ SRR-3	◆ SDR-2		◆ SDR-3	
	C2BMC 8.4							◆ SRR	◆ RFP Rel.		◆ Cont Awd.	◆ SRR-2 PDR 2QFY14
	PTSS	◆ SRR						◆ SRR-2				◆ RFP 1QFY14
	SM-3 IIB							◆ SRR	◆ RFP Rel.			◆ Cont Awd. PDR 1QFY15



System Parameter Trades → SRR



Element Parameter Trades → PDR



Source Selection → Cont Awd



Complete Product Development

SRR - System Requirements Review

IPR - Interim Progress Review

QSR - Quarterly System Review

PDR - Preliminary Design Review

CDR - Critical Design Review

RFP - Request for Proposal



European Phased Adaptive Approach

– Phase III: Enhancing Intermediate Range Missile Defense (By 2018) –

Phase III: Enhancing Intermediate Range Missile Defense (By 2018)



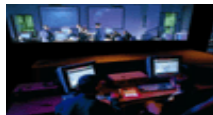
Aegis BMD 5.1 with SM-3 IIA



Aegis Ashore 5.1 with SM-3 IB/IIA (Poland and Romania)



AN/TPY-2 (FBM)



C2BMC Updates

ALTBMD Upper Tier



PTSS

Potential EPAA Enhancements



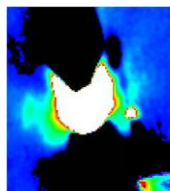
THAAD



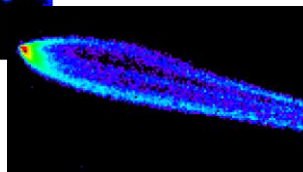
ABIR

Precision Tracking Space System (PTSS)

- Awarded 6 Manufacturing and Readiness Studies contracts – March 2011
- Awarded 2 Focal Plane Risk Reduction contracts – March 2011

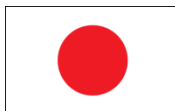


STSS Focal Array Imaging



Flight image processing board June 2011

SM-3 Block IIA



Raytheon Groundbreaking for Standard Missile Production Factory in Huntsville, AL



June 2011

Airborne Infrared (ABIR)



FTX-17 at VAFB July 2011



ABIR MTS-B

Aegis Ashore



Re-locatable Equipment Unit: June 2011



European Phased Adaptive Approach

– Phase IV: Early Intercept MRBMs, IRBMs, And ICBMs (By 2020) –

Phase IV: Early Intercept MRBMs, IRBMs, and ICBMs (By 2020)



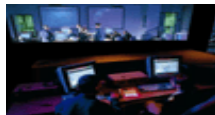
Aegis BMD 5.1 with SM-3 1B/IIA



Aegis Ashore 5.1 with SM-3 IIB (Poland) and SM-3 1B/IIA (Romania)



AN/TPY-2 (FBM)



C2BMC S8.4



PTSS

Potential EPAA Enhancements



THAAD



ABIR



SM-3 BLOCK IIB



U.S.-Poland Bilateral Missile Defense Signing

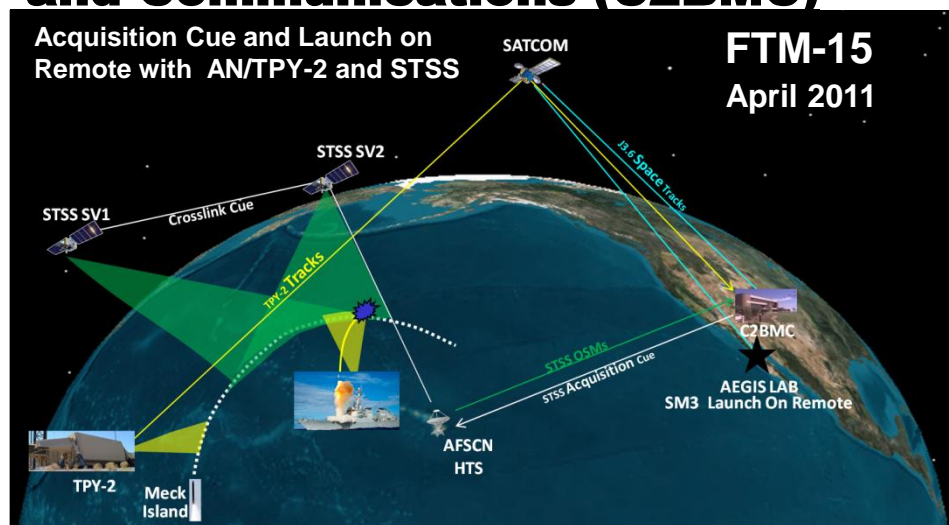
Krakow, Poland
July 3, 2010



Command Control Battle Management and Communications (C2BMC)

Acquisition Cue and Launch on Remote with AN/TPY-2 and STSS

FTM-15
April 2011





International Activity Update

Japanese Aegis Flight Test

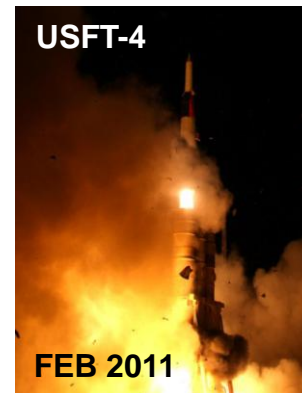


Support for EPAA and NATO Territorial Defense



NATO Lisbon Summit
NOV 2010

Joint U.S.- Israel Arrow Weapon System Test



Foreign Military Sales



U.S./NATO - Russian Federation BMD Cooperation Discussions



Romanian Aegis Ashore Site Announcement

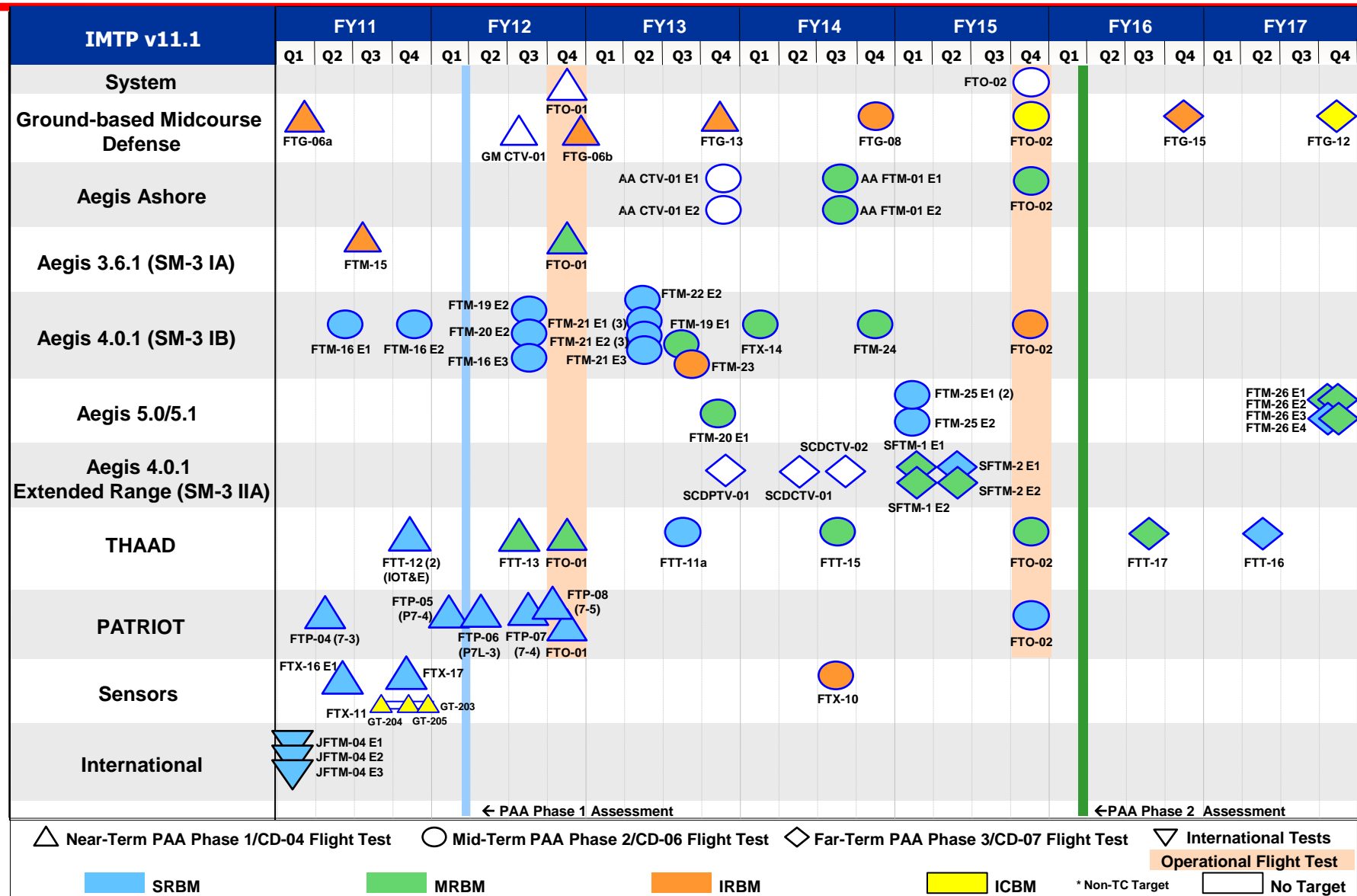


JUL 2011

MAY 2011



Flight Test Schedule





Summary

- **Defend the homeland against limited ballistic missile attack**
- **Defend against regional missile threats**
- **Test new capabilities under realistic operational conditions**
- **New capabilities must be fiscally sustainable**
- **Missile defense must be flexible to adapt as threats change**
- **Expanded international efforts for missile defense**

